Title: Hybrid support vector regression and autoregressive integrated moving average models improved by particle swarm optimization for property crime rates forecasting with economic indicators

Author/Authors: Razana Alwee, Siti Mariyam Hj Shamsuddin, Roselina Sallehuddin

Abstract: Crimes forecasting is an important area in the field of criminology. Linear models, such as regression and econometric models, are commonly applied in crime forecasting. However, in real crimes data, it is common that the data consists of both linear and nonlinear components. A single model may not be sufficient to identify all the characteristics of the data. The purpose of this study is to introduce a hybrid model that combines support vector regression (SVR) and autoregressive integrated moving average (ARIMA) to be applied in crime rates forecasting. SVR is very robust with small training data and high-dimensional problem. Meanwhile, ARIMA has the ability to model several types of time series. However, the accuracy of the SVR model depends on values of its parameters, while ARIMA is not robust to be applied to small data sets. Therefore, to overcome this problem, particle swarm optimization is used to estimate the parameters of the SVR and ARIMA models. The proposed hybrid model is used to forecast the property crime rates of theUnited State based on economic indicators.Theexperimental results show that the proposed hybrid model is able to produce more accurate forecasting results as compared to the individual models.